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ENVIRONMENT

Ms. Tanya Mitchell
Remedial Project Manager
United States Environmental Protection Agency, Region 2
New Jersey Remediation Branch
290 Broadway, 19th Floor
New York, NY 10007-1866

Subject:
Response to Comments for the Data Gaps Sampling and Analysis Plan Addendum 1 and Data Gaps Quality Assurance Project Plan Addendum 1
Rolling Knolls Landfill Superfund Site
Chatham, New Jersey

Date:
August 26, 2015

Contact:
Suzanne Walls

Phone:
865.777.3502

Email:
suzy.walls@arcadis-us.com

Our ref:
B0033203.0004

Dear Ms. Mitchell:

Enclosed are the revised addenda to the Data Gaps Sampling and Analysis Plan (SAP) and Data Gaps Quality Assurance Project Plan (QAPP). These addenda were initially submitted to the United States Environmental Protection Agency (USEPA) on (April 29, 2015). USEPA provided comments and requested revisions in a letter dated (June 17, 2015). Responses to the USEPA's comments are provided below.

Portions of the USEPA's comments were discussed during a conference call held on June 30, 2015. The following participants were present on the conference call: Tanya Mitchell (USEPA), Michael Sivak (USEPA), Michael Clemetson (USEPA), Katherine Mishkin (USEPA), Juan Fajardo (USEPA), Jill McKenzie (NJDEP), Steve Burns (NJDEP), Dave Van Eck (NJDEP), Ricky Chenenko (CDM), Richard Ricci (Lowenstein Sandler LLP), Mickey Faigen (Issues Management, LLC), Michael Draikiwicz (Novartis), Linda Bergsten (Novartis), Andrew Gutherz (ARCADIS), John Persico (ARCADIS), Suzy Walls (ARCADIS), John Samuelian (Integral), and Judi Durda (Integral). Where applicable, the following responses are based on that call.

As an outcome of that call, ARCADIS verified and proposed revisions to several sample locations proposed by the NJDEP. USEPA responded to these proposed revisions in a letter dated August 17, 2015. Where applicable, USEPA responses in its August 17, 2015 letter have been incorporated below.

In submitting the revised Data Gaps SAP and QAPP addenda and response to USEPA comments, the Rolling Knolls Settling Parties specifically reserve all rights granted to them under the September 2005 Administrative Settlement Agreement and Order on Consent, including the right to invoke dispute resolution with respect to any USEPA decisions with which they disagree.

Please contact me at 865.777.3502 if you have any questions.

Sincerely,

ARCADIS U.S., Inc.

Suzanne J. Walls
Project Manager

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Pete Bergeron, Chevron Environmental Management Company
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Linda Bergsten, Novartis Pharmaceuticals Corporation
Richard F. Ricci, Esq., Lowenstein Sandler, P.C.

EPA's Comments on Addendum 1 to the Data Gaps Sampling and Analysis Plan and the Quality Assurance Project Plan dated April 2015 Rolling Knolls Landfill Superfund Site, Chatham, New Jersey

General Comments

1) As previously stated in EPA's General Comment 1 dated October 9, 2014, regarding the Data Gaps Sampling and Analysis Plan, and the Quality Assurance Project Plan for the Data Gaps Sampling and Analysis Plan, September 2014, "The sampling and analysis plan appears to be designed to be a much targeted approach, only sampling for contaminants that previously exceeded site remediation standards in a nearby soil sample. However, the nature of contamination at the site appears to be highly variable and the targeted sampling approach seems to ignore the possibility of any of the other site related contaminants of concern (those not found in the nearby discrete soil sample) to be elevated above site remediation standards in these areas. This is particularly concerning in areas where sample locations may be modified to be located further from the original soil sample due to the edge of the landfill being confirmed to be different than what was previously estimated/delineated. The sampling approach should be adjusted, and all samples within and outside the newly delineated waste materials should be sampled for all of the site related contaminants." All samples collected as part of the approved Data Gaps SAP/QAPP and/or Addendum shall be analyzed for the complete list of laboratory analyses and analytes identified in Table 1 of the approved SAP dated November 2014.

Response: Based on the June 30, 2015 discussion between the Settling Parties and the agencies, full TCL/TAL parameters will be collected for all soil and sediment samples associated with the remaining data gaps sampling work. However, the USEPA indicated that the Settling Parties could review the available soil and sediment data for volatile organic compounds (VOCs) to determine whether VOCs should be analyzed in future samples. The results of this review are included in the attached memorandum. Based on this review, analysis of VOCs in soil and sediment samples is not warranted at all locations. As discussed in the attached memorandum, VOCs were only detected above NJDEP residential standards in 4 of 173 soil samples. Two of these locations are delineated. The remaining two locations have proposed samples, SD-61 and SD-62 (NJDEP samples #16 and 17), in the upcoming round of Data Gaps sampling. As a result, we recommend that all future soil and sediment samples (with the exception of SD-61 and SD-62) be analyzed for full TCL/TAL parameters, excluding VOCs. In addition, we will conduct VOC analyses on the soil samples below the landfill requested by NJDEP, SS-177 through SS-183 (NJDEP soil sample locations 29 through 35).

2) Please record and provide the sampled intervals and sample elevations for all future samples collected for the Rolling knolls Superfund site.

Response: Based on the June 30, 2015 discussion between the Settling Parties and the agencies, the Settling Parties understood that the contour figures provided with proposed sample locations would be sufficient to determine elevation of samples. However, based on comments in the USEPA's August 17, 2015 letter, the locations and elevations of all future samples will be surveyed to satisfy NJDEP requirements.

2) EPA comments and recommendations provided for the Sampling and Analysis Plan should be incorporated into the QAPP, as appropriate.

Response: The QAPP will be revised accordingly.

3) Please ensure that EPA is provided with an Electronic Data Deliverable (EDD) submittal of all recent data following the step-by-step instructions provided in the EPA Region 2 EDD webpage. http://www.epa.gov/region2/superfund/medd.htm.

Response: The final report for the data gaps sampling will include an EDD of all data collected as part of the Data Gaps sampling.

Addendum 1 Data Gaps Sampling and Analysis Plan
Specific Comments:

1. Section 1 Introduction, Paragraph 2: The Addendum is an addition to the approved November 2014 Data Gaps SAP. Please delete the last sentence.

Response: The referenced sentence will be removed, as requested.

2. Section 1.1 Objectives: This section should be revised to reflect that the objective is to complete the objectives originally identified in the Section 1.1 Objectives of the Data Gaps SAP dated November 2014. To meet these objectives USEPA and NJDEP have identified additional soil and sediment samples that are needed to further delineate the nature and extent of contamination at the site. In addition to the samples proposed by USEPA and the Group, NJDEP has also identified additional soil and sediment samples which are attached. The addendum should reflect samples requested from all parties.

Response: Section 1.1 will be revised as follows: The objectives of the sampling proposed herein are to complete the objectives originally identified in Section 1.1 of the approved Data Gaps SAP (November 2014) and to address additional delineation concerns identified by the USEPA and NJDEP that were requested (letters dated June 17, 2015 and August 17, 2015) to further delineate the nature and extent of contamination at the site.

3. Section 1.1 Objectives: NJDEP previously commented that in addition to Human Health-Based Soil Remediation Standards (SRS), NJDEP has issued Ecological Screening Levels (ESLs) that need to be included in the evaluation of soil, sediment, surface water, and pore water sample results. It does not appear that delineation to NJDEP's Ecological Screening Criteria is addressed in this SAP. It is assumed by NJDEP that additional delineation from what is proposed here will be required in order to complete the Ecological Assessments associated with the site. Please clarify.

Response: Based on the June 30, 2015 discussion between the Settling Parties and the agencies, soil delineation will be conducted by comparing site soil data to residential and non-residential NJDEP Soil Remediation Standards (SRSs), which USEPA has established as applicable or relevant and appropriate requirements (ARARs). USEPA indicated that it does not delineate nature and extent using Ecological Screening Criteria or Impact to Ground Water (IGW) SRS numbers, as these values are not established ARARs.

4. Section 1.1 Objectives: Please include a detailed discussion regarding if and how, the topographic

variations across the study area have been and will be considered when selecting sampling locations and sample intervals for delineation purposes.

Response: In general, the topography of the site is flat, and the landfill is slightly higher than the surrounding areas. Delineation samples collected outside the boundary of the landfill, often in areas that are at times inundated, are lower than the landfill because the landfill was constructed by filling a low-lying area. In addition, areas where constituents could flow in runoff from the landfill were targeted in previous surface water and sediment sampling.

After the discussion between the Settling Parties and the agencies on June 30, 2015, NJDEP provided information on their proposed sample locations, and where necessary, ARCADIS field-verified that several of these locations were in topographically lower areas. Where appropriate and approved by USEPA in their letter of August 17, 2015, modified locations will be sampled to help ensure that NJDEP's objective of sampling in a topographically low area will be met.

5. Section 2. Additional Soil and Sediment Sampling: NJDEP requests that all future "soil and sediment samples will be collected in 6 inch increments [as stipulated in the NJPDES Field Sampling Procedures Manual (FSPM)] rather than the 1 foot intervals that are proposed. Although this would have ideally been done throughout the SI and RI process, it should be incorporated into the final stages of the delineation work associated with the site. In consideration of the historic data which included 1 foot sampled intervals, at least two delineation samples in 6 inch increments should be collected at each location at which horizontal delineation is proposed. For example, if the 0-1 foot interval is being delineated, samples should be collected at 0-6 inches (except for VOC samples) and at 6 inches – 12 inches.

A review of the soil data collected to date indicates a level of unpredictability in both the horizontal and vertical distribution of contaminants across the site. There are several sample locations that show increasing contaminant concentrations with depth (e.g. SS-46, SS-57, SS-63, SS-64, SS-73, SS-74, SS-75, SS-98, SS-101, SS-102, SS107, and SS-108). This needs to be considered when designing a soil sampling delineation strategy. In consideration of this, it is requested that more than just the surficial interval be evaluated at the delineation locations. Please include additional sample intervals at each proposed boring location in order to complete the vertical delineation of the identified contamination. This information should also be reflected on Table 1.

Response: Based on the June 30, 2015 discussion between the Settling Parties and the agencies, NJDEP clarified that surface soil samples collected from the 0 to 1 foot interval would be sufficient for delineation, provided that VOCs were collected from the deeper half of the sample (6 to 12 inches below ground surface). In addition, a deeper sample from 1 to 2-foot below ground surface will be collected at each soil perimeter location, with the VOC portion of the sample collected at 18 to 24 inches below ground surface (see response to Specific Comment #6a), as requested in the USEPA's August 17, 2015 letter. See General Comment #1 for a discussion of VOC analysis in soil.

As an alternative, the Settling Parties propose to collect the samples as described above, and analyze the surface soil sample (0 to 1 foot interval). The deeper sample (1 to 2 foot interval) would be held pending the results of the surface soil sample. If any of the surface soil sample results exceed a New Jersey Residential Direct Contact Soil Remediation Standard (RDCSRS), the deeper sample would then be analyzed. This approach would save time in data validation, leading to faster completion of

the work. If the USEPA approves this alternative, the Settling Parties can revise and resubmit the Data Gaps SAP and QAPP addenda within 10 days after approval.

6. Section 2. Additional Soil and Sediment Sampling: To assist in the development of a Sampling Plan that will address the above referenced soil delineation concerns, enclosed please find a map of the Northern and Southern Areas of the Rolling Knolls Landfill site, Figure 3b. This map illustrates the minimum number of additional samples (from what was proposed in the April 2015 submittal) that will be necessary to fill the known data gaps. Be advised that these samples are in addition to, not in lieu of, the proposed sample locations on *Figure 3a* and *Figure 3b* of the April 2015 Addendum 1 proposal. The following sampled intervals are requested at the illustrated locations:

a. Perimeter Locations: Perimeter samples must be collected at the marked locations beyond the landfilled boundaries with soil samples collected from the 0-6" and 6"-12" intervals to characterize and delineate contamination in the vadose zone. If the water table is at the surface, these samples will serve to characterize and delineate surface soil contamination to the New Jersey Residential Direct Contact Soil Remediation Standard (NJDCSRS). At these same locations, soil samples must also be collected from saturated soil in the 30-36" interval below grade to further delineate soil contamination to the NJRDCSRS. If recent sample data have already been collected from any of the marked locations, clean sample results may be used to verify delineation in that location and depth or, conversely, to verify non-compliance in that location and a new soil sample collection point established out from that location. However, any existing clean perimeter sample locations will still require a vertical sample to address both the inconsistent contaminant distribution and the vertical delineation data gaps associated with the site. In addition, if the existing perimeter sample results will be used to meet the delineation requirements, the results must be compared to the strictest applicable NJDEP- SRS.

Response: Based on the June 30, 2015 discussion between the Settling Parties and the agencies, NJDEP agreed to provide a table of rationales for each requested sample location. Upon receipt of that table (received July 20, 2015), ARCADIS conducted a site visit to assess several of the proposed locations. Following that assessment, ARCADIS and the Settling Parties submitted revised sample figures and a table with proposed revisions to the sample locations to USEPA on August 4, 2015. USEPA responded to those proposed revisions in their August 17, 2015 letter, and the Data Gaps SAP and QAPP addenda have been revised in accordance with this response.

Based on the June 30, 2015 discussion between the Settling Parties and the agencies, NJDEP determined that one surface soil interval (0 to 1 foot) was sufficient, provided that the VOCs were collected from the deeper half of the sample (6 to 12 inches below ground surface). In the August 17, 2015 letter, USEPA stated that the deeper soil sample should be collected at 1 to 2 feet bgs, with the VOC portion of the sample collected at 18 to 24 inches below ground surface. VOCs will be analyzed at the locations indicated in the response to General Comment 1, and in the attached memorandum, if approved by the USEPA.

As an alternative, the Settling Parties propose to collect the samples as described above, and analyze the surface soil sample (0 to 1 foot interval). The deeper sample (1 to 2 foot interval) would be held pending the results of the surface soil sample. If any of the surface soil sample results exceed a New Jersey RDCSRS, the deeper sample would be then be analyzed. This approach would save time in data validation, leading to faster completion of the work. If the USEPA approves this alternative, the

Settling Parties can revise and resubmit the Data Gaps SAP and QAPP addenda within 10 days after approval.

b. Interior Landfill Samples: These interior samples must be collected at the marked locations within the landfilled boundaries with soil samples collected from the 0-6" interval immediately beneath the bottom of landfill materials to characterize and delineate contamination in the vadose zone. If the water table is encountered at this depth, these samples will serve to characterize and delineate soil contamination to the New Jersey Residential Direct Contact Soil Remediation Standard (NJDCSRS). At these same locations, soil samples must also be collected from saturated soil just above the underlying clay layer to vertically delineate soil contamination to the NJRDCSRS. If the Group collects soil samples at a depth shallower than the top of the clay layer rather than go directly to the clay layer, NJDEP has no objections; however, the vertical limit of contamination to the appropriate standard must be documented with soil sample results below the most stringent NJSRS.

Response: Based on the June 30, 2015 discussion between the Settling Parties and the agencies, the objective of these samples is to help define the lower boundary of a Deed Notice to be placed on the landfill as a component of the remedial action. In the August 17, 2015 letter, USEPA and NJDEP clarified that at each of these borings, one sample should be collected from the 1-foot interval immediately below the bottom of the landfilled material, and a second sample should be collected from the 1-foot interval immediately above the top of the underlying clay layer. The samples will be analyzed for full TCL/TAL constituents.

As an alternative, the Settling Parties propose to collect the samples as described above, and analyze the sample from the 1-foot interval immediately below the landfilled material. The deeper sample (1-foot interval immediately above the clay layer) would be held pending the results of the shallower soil sample. If any of the shallower soil sample results exceed a New Jersey RDCSRS, the deeper sample would be then be analyzed. This approach would save time in data validation, leading to faster completion of the work. In addition, only one sample should be required at each of these boring locations for vertical delineation for purposes of preparing a Deed Notice. If the USEPA approves this alternative, the Settling Parties can revise and resubmit the Data Gaps SAP and QAPP addenda within 10 days after approval.

c. Please note that two of the requested sample locations are within the footprint of, what appears to be, surface water bodies (e.g. the sample located directly north of SS-152 and the sample located due east of SS-10). Sediment samples are requested at these locations.

Response: The Settling Parties will collect the requested sediment samples.

7. Section 2. Additional Soil and Sediment Sampling: Due to the level of unpredictability noted in the distribution of the many contaminants associated with the site, a revision to the proposal is requested to include analyses for all site-related contaminants of concern at all sampling points rather than limiting the analytical to select compounds. Please ensure all soil and sediment samples are analyzed for the complete list of laboratory analyses and analytes identified in Table 1 of the approved SAP dated November 2014.

Response: The Settling Parties will analyze all samples related to completion of the Data Gaps for full TCL/TAL, excluding VOCs. (Note: As stated in USEPA General Comment #1, VOCs will be collected from NJDEP proposed samples #16, #17, and vertical delineation borings 29 through 35).

8. Section 2.1.3 Soil Sampling Analyses, Paragraph 2: Please explain the reference "connection to the landfill." Clarify if both SS-174 as indicated here and SD-50 as indicated in Section 2.2 will be analyzed at the same time if the results from SD-49 show a "connection with the landfill."

Response: The Settling Parties believe the results observed in sample SS-164 may potentially be attributed to sources other than the landfill, as this location is approximately 800 feet from the boundary of the landfill and surface water in the area surrounding SS-164 likely flows from locations other than from the landfill. The phrase "connection to the landfill" refers to analytical results or other observations that confirm that constituents from the landfill are present at levels above RDCSRSs or NRDCSRSs. USEPA has requested sample SD-47, and the Settling Parties have opted to add three additional samples in that area that are closer to the landfill boundary (SD-49, SD-50, and SS-174). All four samples will be collected at the same time; however, samples SD-50 and SS-174 will not be analyzed if the results from SD-49 are below the NJDEP sediment screening values. The Settling Parties believe if SD-49 is below all standards, it is reasonable to conclude that results above standards at locations farther from the landfill are a likely indication that a source other than the landfill may be contributing to the elevated concentrations.

9. Section 2.2.2 Sediment Sampling Procedures: Currently, the text states that sediment samples will be collected at 0-0.5' depth. Table 1 records the depth interval to be 0-1.0. Please clarify the final depth in the text, Table 1 and QAPP Worksheet #18 for consistency.

Response: A sentence was inadvertently omitted from this section. The text has been revised to read: "At sample locations where VOC analysis will be conducted (i.e., SD-61 and SD-62) a sample for VOC analysis will be collected from the 0.5 to 1.0-foot interval in accordance with NJDEP (1998). Sediment in the 0.0 to 0.5-foot interval will then be homogenized and transferred directly into laboratory-supplied containers for other analytical parameters."

Addendum 1 to the Quality Assurance Project Plan for Data Gaps Sampling and Analysis Plan Specific Comments:

PROJECT MANAGEMENT and OBJECTIVES ELEMENTS
1. Worksheet #14 & 16: Please update the schedule in the worksheet to reflect the additional work being proposed.

Response: Worksheets 14 and 16 has been updated as requested.

MEASUREMENT/DATA ACQUISITION ELEMENTS
2. Worksheet #17: This worksheet also needs to be updated to reflect the sampling rationale for the proposed work.

Response: Worksheet 17 has been updated as requested.

3. Worksheet #18: See SAP Specific Comment 1.

Response: Worksheet 18 will be updated as requested in SAP Specific Comment 1.

4. Worksheet #20: Addendum 1 to the QAPP limits the parameters to be analyzed at each proposed

sampling point. Given the level of unpredictability in the distribution of the many contaminants associated with the site, please include all site-related parameters in the proposed delineation sampling as specified in the approved Table 1 of the SAP.

This worksheet specifies duplicates for soil PCB and soil metals, but no duplicates for soil PCB congeners, and no duplicates for any sediment analyses (PCB aroclors, metals, pH, TOC). Please provide an explanation for why duplicates for the soil PCB congeners and sediment analyses are not being collected.

Response: Initially, the Settling Parties did not feel a field duplicate was necessary for PCB congeners, given that only one sample analysis was proposed. Based on the total number of PCB congener analyses (collected and proposed) in soil and sediment during Data Gap sampling, the Settling Parties still believe additional field blanks are not necessary at this time.

The Settling Parties reevaluated the need for duplicates of sediment analyses now that NJDEP has requested additional sediment samples. Worksheet #20 has been revised accordingly.

Tables

1) **Table 1, Sampling Locations, Depths, and Analyses:** Please provide a revised Table 1 to be consistent with the comments made in regard to number of proposed sample locations, sampled interval(s) at each boring location, analytical requirements, etc. The Notes and Footers should be modified, as appropriate.

Response: Table 1 will be updated as requested.

Figures

1) Figure 3b: For SS-140, Figure 3B indicates that data for PCB congeners still has not been received. Do you know why this is, since the sampling date is January 2015 and we have all the other data? Please update figure, as appropriate.

Response: Data results for PCB congeners were inadvertently left off of Figure 3b. Figure 3b has been updated to include these results.

Remedial Investigation General Concerns and Analytical Requests
Rolling Knolls Landfill Superfund Site, Chatham, New Jersey

Below are additional comments received from NJDEP. It should also be noted that it is not USEPA's practice to delineate nature and extent using Impact to Ground Water (IGW) SRS numbers. Although we may compare data to IGW numbers in the RI to see if there are exceedances, USEPA also uses GW data to provide another line of evidence as to whether there may be sources of GW contamination present. EPA typically does not use NJ IGW numbers, which are TBCs, to delineate in the RI.

General RI Concerns

1. General Comment: It is not apparent that the soil data collected in regard to the Site is being compared to all of the applicable NJ Site Remediation Standards (SRS). NJDEP's *Technical*

Requirements for the Remediation of Contaminated Sites (N.J.A.C. 7:26E, a.k.a. "the Tech Rules") specify the criteria by which delineation is determined to be complete. In years past, comments were provided to USEPA by the NJDEP Case Manager in regard to previous RI proposals. It is noted that those previous comments also referenced N.J.A.C. 7:26E Remedial Investigation (RI) requirements as they pertain to this Site. Be advised that the currently proposed work falls short of meeting these previously stated requirements.

Rather than provide a point-by-point analysis of existing and proposed sampling data or locations, respectively, Arcadis is referred to N.J.A.C. 7:26E-4.2(a) 1 to determine the level of remedial investigation sampling required, based upon the future disposition they determine is appropriate for the site and surrounding properties. Please note that, regardless of future site use, areas of off-Site contamination must be delineated horizontally and vertically to the strictest applicable NJDEP Soil Remediation Standards (SRS).

Response: The initial Remedial Investigation and subsequent Data Gaps SAP were designed to meet USEPA requirements and have been approved by USEPA. When complete, they will have successfully characterized the nature and extent of constituents of concern at the site, and will form the basis for decisions about site remedial actions. The USEPA approach taken still achieves the goals of the NJDEP Tech Rules to characterize the site and delineate the constituents of concern. We understand that the sampling incorporated into this addendum, which was developed based on the Group's review of and comments on the NJDEP's sampling rationale table and the USEPA's response to those comments, is satisfactory to the USEPA and the NJDEP.

As noted in the response to USEPA Specific Comment 3 above, delineation will be to the RDCSRSs and the NRDCSRSs and will not include the IGWs or EBSLs.

a. Please clarify that delineation to the appropriate NJ Soil Remediation Standards (SRS) will be incorporated into the design and implementation of the RI sampling activities. Based on the maps and tables presented to date, it is not apparent that the delineation data are being compared to all of the applicable NJ SRS which should include, but not be limited to, the Impact to Ground Water (IGW) SRS.

Response: See response to USEPA Specific Comment 3.

2. General Comment: NJDEP previously commented that areas of incomplete soil contamination delineation appear to include the southeastern, northwestern, and eastern areas of the landfill. Based upon information presented, and depending on the future disposition of the Site, vertical (and horizontal) delineation may be incomplete across a large part of the landfill (again, see N.J.A.C. 7:26E-4-2(a) 1).

In addition, NJDEP had previously noted that lead and a few select other metals concentrations are elevated in soil and ground water on the western side of the landfill in red-hashed areas on the figures provided, and that delineation appears incomplete in this area and/or this area may be a potential hot spot. Depending on the disposition of the Site, Arcadis may also need to evaluate levels of PAHs to ensure compliance with the Tech Rules (e.g., whether the compliance requirement is to impact to ground water, residential, or non-residential remediation standards) within the landfilled areas. This needs to be considered when designing and implementing the RI delineation sampling.

Response: Concentrations of all constituents, including PAHs and lead, have been considered

when designing and implementing the Data Gaps sampling. The additional sampling proposed in the Data Gaps SAP Addendum 1 includes sampling requested by NJDEP that addresses the vertical and horizontal delineation concerns.

3. General Comment: It is requested that when determining whether delineation is complete, that consideration be given to not only the sampled interval in relation to ground surface, but also to the elevation of the sample in relation to the elevation of the contamination being delineated. It is noted that, due to the topographic variations across the study area, some of the surficial delineation samples appear to be collected at slightly higher elevations than the contaminated interval(s) being delineated. Including the sample elevations (in addition to the sampled interval in relation to ground surface) on comprehensive data tables will enable Arcadis, the EPA and the DEP to effectively evaluate whether delineation of the identified contamination is truly complete (see comment D.1. below.).

a. This is especially critical when delineating beyond the landfill boundaries. The mode of migration and deposition of the contamination identified beyond the landfilled areas needs to be considered. If transport of this contamination is assumed to have occurred as suspended material in runoff from the landfilled areas during storm / rainfall events, it would be critical to assess lower elevation areas that would operate as depositional zones. If other modes of deposition (i.e. artificial filling, etc.) are suspected beyond the footprint of the landfill, additional sampling locations at varying elevations, including high spots, would be warranted.

Response: The mode of migration for contamination associated with the landfill has been considered as part of the Data Gaps sampling. As delineation samples are collected off the boundary of the landfill, low lying areas that may act as depositional areas are being targeting for sampling. This is incorporated in the sampling proposed in the Data Gaps SAP Addendum 1. Furthermore, the additional sampling proposed in the Data Gaps SAP Addendum 1 includes sampling requested by NJDEP that addresses its vertical and horizontal delineation concerns.

b. Please clarify how it will be determined whether the waste within the landfill is contributing to the elevated dissolved phase concentrations of what are considered to be naturally occurring compounds (e.g. iron, aluminum, and manganese). As stated in previous comments, although these compounds are considered naturally occurring, the concentrations of these metals in ground water are sometimes notably higher within the landfilled area.

Response: The determination will be based largely on the comparison of metals concentrations in wells that are in or downgradient of the landfill to the wells that are upgradient of the landfill (e.g., MW-8, X-6). In addition, groundwater geochemical data such as dissolved oxygen content and pH will also be considered.

Analytical Data Requests

1. General Comment: In order to properly evaluate the proposed final phase of the RI work, it is requested that Arcadis provide the following information in the requested format: A comprehensive data results table which lists all soil results collected to date (including the most recent data gap sampling results) compared to all applicable NJ - SRS. At a minimum, the table should include the sample designations; sampled intervals; sample elevations; date of sampling; sampling results; all NJ-SRS and Screening Levels against which the data is being compared [including, but not limited to, the Residential Direct Contact Criteria (RDCC) SRS, the IGW SRS and the NJ Ecologic Screening Levels (ESLs)]; etc.

This table should be cross-referenced to maps which illustrate the locations of all samples collected, to date, in regard to the site.

Response: Soil data tables will be provided in the final Data Gaps Report (submitted after completion of all soil and sediment sampling), including all samples collected as part of the Data Gaps sampling effort. Comprehensive soil data tables, including all soil samples collected as part of the SCSR and Data Gaps SAP will be provided to NJDEP following completion of the soil and sediment sampling and will also appear in the RI Report. Currently, all historical data are available in the SCSR, and all recent data are available in the Interim Technical Memorandum tables and figures (submitted on February 17, 2015 and February 27, 2015) that summarize soil data to date.

2. General Comment: To enable a more effective review of the monitoring well proposals as well as to put the updated data in context, the following information is requested to be provided:

a. *Monitoring Well Construction Table*. This table should include, but not necessarily be limited to, the following information for all site – related monitoring wells: total depth; well diameter; screened interval; top of casing elevation; ground surface elevation; etc. Please also include the construction specifications of any temporary well points that were advanced at the site. This table should be updated, as needed, in future reports.

Response: Monitoring well construction tables will be provided in the Final Data Gaps Report, including all groundwater monitoring wells constructed as part of the Data Gaps sampling effort. Comprehensive monitoring well construction tables, including all historical monitoring wells, all monitoring wells installed as part of the SCSR, and all monitoring wells installed as part of the Data Gaps SAP will be provided to NJDEP following completion of the Data Gaps SAP and will also appear in the RI Report. Well construction data for wells installed previously are available in the SCSR.

b. The well logs associated with the "x" series of wells (X-1 through X-6) installed at the site. This should include the geologic / stratigraphic logs generated during boring advancement and the final well construction logs for these wells.

Response: See response to Analytical Data Request Comment #2a. A well search was completed during the preparation of the SCSR. All available well permits and records for the "x" series of wells (X-1 through X-6) were reviewed and provided in the SCSR.

c. *Comprehensive Ground Water Summary Data Tables* for each monitoring well and temporary well point associated with the site. These tables should include all historic ground water sampling detects up to the most recent sampling event. Ideally this table will also include the hydraulic gauging data associated with each sampling event conducted at the site. If this is not possible, the hydraulic gauging data may be included on a separate table. These tables should be updated, as necessary, to include the most recent ground water quality data.

Response: Groundwater data tables will be provided in the Final Data Gaps Report (submitted after completion of soil and sediment sampling), including all permanent and temporary groundwater samples collected as part of the data gaps sampling effort. Comprehensive groundwater data tables,

including all groundwater samples collected as part of the SCSR and all groundwater samples collected as part of the Data Gaps sampling will be provided to NJDEP following completion of the Data Gaps SAP and will also appear in the RI Report. Currently, all historical data are available in the SCSR, and all recent groundwater data are available in the Interim Technical Memorandum (submitted February 17, 2015 and February 27, 2015) tables and figures.

d. Additional detail regarding the Tentatively Identified Compounds (TICs) identified in ground water at the site, including the identity and concentrations of the TICs identified in ground water during each sampling event is requested. The tabulated data include on the maps being submitted do not contain this information.

Response: Additional detail, including concentrations of TICs identified in groundwater, will be provided in data tables in the final Data Gaps Report.

e. Please verify that the sampling protocols required in the NJ FSPM are being followed and that the appropriate purge and sampling documentation will be provided when reporting the data derived from these sampling events. It is noted that a low flow purge and sampling (LFPS) method is being utilized for the collection of ground water samples.

Response: All data gaps sampling work has been completed in accordance with USEPA requirements, using approved SOPs. In general, the USEPA-approved LFPS method is similar to the LFPS NJDEP method provided in the NJ FSPM and generates valid, reliable data.

It is noted that the interval targeted for sampling within the water column at site-related monitoring wells is variable between wells. It is not readily apparent that the worst case zones (i.e. those that coincide with the identified subsurface contamination) are being selected for low flow purge and sample collection at each monitoring well. As this may affect interpretation of the degree of landfill related impacts to the shallow water bearing zone, it is requested that consideration be given to where the pump is set during low flow purge and sample collection at each monitoring well during future sampling events.

Response: Groundwater samples are collected in accordance with the methods presented in the USEPA-approved sampling SOPs. The midpoint of the saturated portion of the well screen is targeted for sampling. The data quality objectives (DQO) can be met without sampling multiple intervals within the saturated well screen.

It is also requested that an evaluation be conducted as to the vertical hydraulic gradients that exist at the site within the monitored portion of the saturated zone. As part of this evaluation, please also determine the hydraulic relationship between the shallow ground water at the site and the wetlands / surface water bodies in the vicinity of each ground water monitoring point. It is assumed that this hydraulic relationship may change seasonally in some areas across the site which may affect interpretations of the ground water data, especially if seasonal variability of hydraulic gradients is not considered when designing the ground water sampling schedule.

Response: The monitoring well network at the site includes only wells that cross the water table. There are no well nests or wells that monitor zones deeper than the shallow, water-table zone. This approach is appropriate because the purpose of the groundwater monitoring has been to observe impacts to the shallowest water-bearing interval, where constituents from the landfill are most likely

to be detected. The most recent data available as of this response indicate only one permanent well where constituents of concern (excluding naturally occurring metals) are present at levels above the Ground Water Quality Criterion (GWQC): benzene, 1,4-dioxane, and bis(2-chloroethyl)ether at monitoring well MW-3. This area is being further evaluated through installation and sampling of temporary monitoring wells, a permanent monitoring well, sediment sampling, and surface water sampling.

Given the low topographic relief at the site, groundwater flow is likely shallow and horizontal, and vertical gradients are expected to be low. Historical groundwater contours on the landfill and surrounding areas indicate a low horizontal hydraulic gradient from the landfill to the surrounding areas to the east, south, and west, indicating that flow from the landfill is to the offsite areas. The flow pattern is consistent with the topography of the area (the landfill is slightly elevated compared to the surrounding wetlands and surface water bodies) and little vertical migration is expected. Because the landfill is underlain by an extensive and thick (greater than 40 feet) clay layer, vertical migration below the depth of the top of the clay is highly unlikely. Therefore, investigation of vertical flow is not necessary.

The hydraulic relationship between groundwater and surface water at the site is being studied as part of the Data Gaps SAP, and the results of that investigation will be included in the final Data Gaps Report.